1. INTRODUCTION

This report provides information on the characterization of environmental conditions in Washington, DC. It compiles information from a multitude of sources for an evaluation of the state of the environment in DC, focusing on topics that affect human health and ecological resources. This report is intended to help decision makers, resource managers, and the public to make prudent, informed choices in shaping our environmental future. In a sense, this document is a road map - it tells us where we have been, where we are now, and discusses where we need to go in the future. This report's subtitle, "A Scientific Foundation for Setting an Environmental Agenda," reflects this concept of examining our current knowledge in order to improve environmental conditions in the future.

Scope of Report

- DC's Environmental Setting
- Sources of Pollution
- Human Health Impacts
- Health of Ecological Resources
- Recommendations for Further Study and Efforts to Improve Environmental Conditions

In many ways, this report complements the ground-breaking work of "Our Unfair Share: A Survey of Pollution Sources in Our Nation's Capital" (AAEA, 1994), by delving deeper into the science to help answer questions about sources of pollution and exposure of the population to contaminants in the air, water, and land. While "Our Unfair Share" paved the way to begin assembling the pieces to solve this puzzle, this report adds pieces that expand the perspective with more quantitative information on sources of pollution and potential exposures and risks to human health and ecological resources.

> "Researchers should investigate specific sources and sites, specific pollutant types, and the specific impacts and effects of pollution on human and environmental health."
>
> "Our Unfair Share: A Survey of Pollution Sources in Our Nation's Capital" (AAEA, 1994)

This report provides a value-added assessment of environmental risks in DC; however, the effort is far from complete. Data are scarce on levels of pollutants in the environment in DC. As long as there are large data gaps, it will be difficult to draw definitive conclusions about the impacts of environmental contamination on human health and ecological resources.

One of the first steps is to better understand the current condition of the environment in order to address the complex problems facing the District as we enter the next century. While pollution control efforts of the last three decades have been successful in improving air quality and reducing contamination of rivers and streams, the problems we currently face require a new way of doing business. Twenty-five years ago, the problems were obvious - huge smokestacks billowing smoke into the air, dead fish on the shorelines, and drums of hazardous wastes. Today the challenges are less apparent - trace levels of chemicals in our drinking water, lead dust from paints used years ago in houses, and stormwater runoff from our streets and parking lots. These new types of problems require new approaches to environmental protection. Solutions depend on a better understanding of the complex scientific issues involved in our local environments. This environmental characterization of the District of Columbia is a scientific foundation for setting an environmental agenda; it reviews the current state of scientific knowledge on environmental quality in DC. It also recommends future efforts to improve environmental quality for the residents of Washington, DC.

> "Strong science provides the foundation for credible environmental decision making. With a better understanding of environmental risks to people and ecosystems, EPA can target the hazards that pose the greatest risks."
>
> Expert Panel on the Role of Science at EPA (U.S. EPA, 1992a)

This introductory section presents information on the purpose and scope of this study, the background, and the approaches that were used to obtain and evaluate information. Also described are some of the limitations of the study, many of which result from the lack of data. The remainder of the report is organized in a manner that first presents basic facts and information and then builds details (and complexity) in the latter sections. Specifically, Section 2 describes the environmental setting in DC, the overall picture of environmental conditions as summarized by various statistics. Section 3 describes factors influencing environmental conditions in DC, including inventories of regulated "point sources" of pollution as well as "nonpoint sources" that are more difficult to account for. Section 4 examines potential human health impacts through exposures to contaminants from drinking water, fish consumption, air, and others. Similarly, Section 5 characterizes ecological health in DC, with emphasis on the aquatic resources in the District's rivers and streams. Conclusions and recommendations are provided in Section 6, with respect to the most prevalent problems facing DC's environmental health. This section includes recommendations for future studies and efforts to reduce environmental risks. Section 7 lists the references (journal articles, reports, books, meetings, personal contacts) used to compile this report.

1.1 PURPOSE AND SCOPE

> **Major Questions**
>
> - What is the condition of the environment?
> - Is it getting better or worse?
> - What factors contribute to environmental conditions?
> - What are potential environmental risks to human heath and ecological resources?

The purpose of this document is to review, analyze, and report on environmental conditions in Washington, DC. This report compiles scientific information to help answer some of the major questions about the condition of the environment in the District. Focusing within the District's borders, this report characterizes sources of environmental pollution, examines relative impacts of major sources, describes environmental risks to human health, and characterizes the health of ecological resources. Finally, this report presents recommendations for potential actions that can be taken as well as further studies to improve our knowledge of environmental impacts to residents of the District and the local ecosystem. The intended use of these recommendations is for consideration by decision makers and the public in taking action to improve environmental conditions in the District.

This study was designed to take a broad perspective of the condition of environmental "health" (human and ecological). The scope of this report is broad: it provides information on specific sources of pollution, it discusses human exposures to contaminants from the air we breathe and the water we drink; and it talks about actions that can be taken to reduce potential impacts. However, there are limitations to the scope of this study and report. (See Section 1.4.)

1.2 BACKGROUND

EPA Region 3 has established a cooperative program to study community-based environmental protection (CBEP) in selected urban areas within its boundaries. CBEP is a geographic-driven process that utilizes science, information sharing, partnership building, and other considerations to achieve benefits for human and ecological communities. Such environmental initiatives involve estimating the relative environmental health and ecological risks present within the area, and granting awards to local community groups to develop and implement mechanisms to obtain public opinion of their local environmental quality and risks. Also, these projects are being initiated in part out of interest in environmental justice issues. One area selected for this type of investigation is the District of Columbia. EPA Region 3, in cooperation with EPA's Office of Pollution Prevention and Toxics (OPPT) and the DC Department of Consumer and Regulatory

Affairs/Environmental Regulation Administration (DCRA/ERA), is examining the relative risks of numerous aspects of environmental health and ecological conditions in the District of Columbia.

Numerous studies have been conducted on environmental conditions in DC, but these studies have mostly addressed separate pieces of the puzzle. Some studies have examined the condition of aquatic resources in the Anacostia River, while others have focused on environmental justice issues in DC. These topics, while of critical importance, are just parts of the overall environmental picture in Washington. A "big picture" analysis, with a more comprehensive perspective, is needed to integrate information from previous studies in this broader context. A broader scope of knowledge will enable decision makers to make more informed decisions about environmental protection and resource management.

1.3 APPROACH

This characterization of environmental risks in Washington, DC, is based on data previously collected by government agencies, universities, private organizations, and other individuals that have studied these topics. Although data are scarce, it was possible to characterize some of the potential environmental risks to human health and ecological conditions. This section summarizes the approaches that were used to identify, collect, evaluate, and analyze the information included in this report. In general, data collection was accomplished in the winter and spring of 1996 through the following means:

Approach

- Utilize Existing Data/Information
- Contact Local Researchers
- Analyze/Interpret Data
- Characterize Risks

- Use of in-house libraries/ journals/newsletters;
- Electronic literature searches of published scientific journals;
- Contacts with known experts;
- Telephone calls to government agencies, private organizations, and colleges/universities;
- Attendance at public meetings; and
- Electronic data base searches for environmental emissions data. (See Section 3.)

1.3.1 Automated Literature Search Strategies

Sources of information queried through literature searches included major bibliographic retrieval services, scientific/medical information systems, and nonbibliographic data bases. Electronic literature searches were conducted of numerous journals, reports, conference proceedings, industry papers, dissertations, newspaper articles, and books. The two primary services used in these searches were Dialog Knight-Ridder Information, a bibliographic retrieval service, and the National Library of Medicine's MEDLARS, a scientific/medical information system. Together, these data bases offer more than 300 component files on all major areas of interest (which includes science, engineering, industry, business, and reference).

The searches were conducted using several combinations of key words, including:

- Washington and environ and human health and risk assessment;
- District of Columbia and human health and environmental (health or risk);
- District of Columbia and (exposure or risk or toxic) and (environ or pesticide); and
- District of Columbia and health and environ and (exposure or risk or toxic) and (pollutant or contaminant or pesticide).

A more detailed account of the literature search approach and results is presented in Appendix B.

1.3.2 Contacts Made for Data Collection

Contacts were made with individuals in many organizations: local government agencies (DC Department of Consumer and Regulatory Affairs - Environmental Regulation Administration, Metropolitan Washington Council of Governments, Interstate Commission on the Potomac River Basin), universities (Howard University, University of the District of Columbia), Federal agencies/military (EPA, Department of Agriculture, Department of the Navy, U.S. Army Corps of Engineers), organizations (African American Environmentalist Association), and many private companies. In addition to these contacts, attendance at public meetings in DC; attendance at the Anacostia Federal Workplan meeting of the Chesapeake Bay Program Federal Agencies Committee; and visits to the Dalecarlia Drinking Water Treatment Plant, the Anacostia Museum, and Anacostia Park (to observe fishing activities) helped in collecting information from many individuals. These contacts yielded reports, published articles, and unpublished data as well as further insight into environmental risks in DC.

1.3.3 Data Analysis Approach

This study evaluated existing data on sources of pollution in DC and concentrations of chemical contaminants in media, and examined the potential for human exposure and ecological impacts using approaches that have been tested by time. The highlights of this report are Sections 3, 4, and 5. These sections present value-added assessments of information about sources of pollution in DC and potential environmental impacts to human health and the environment. Procedures to evaluate the potential of point sources have been used extensively in preliminary environmental assessments of releases from industrial facilities. For example, the technique used to assess environmental impacts of discharges of wastewaters to surface waters has been used in support of EPA's Office of Water since the 1970s in developing regulatory standards (Versar, 1995). Evaluation of the potential for human health impacts from a variety of sources is based on approaches devised from more than 20 years of exposure assessment methodology development. Section 4 presents the evaluation of such human health risks from a variety of potential exposure scenarios. In general, this study attempted to obtain actual data on levels of contaminants in environmental media (water, air, soil) to which people may be exposed. Also, data were examined on activity patterns in DC (e.g., fishing in the Anacostia and Potomac Rivers) to characterize potential risks. Where possible, existing assessments and professional judgement were used in assessing impacts to human health. For the ecological characterization, monitoring data were obtained on levels of contaminants as well as from surveys of the condition of biological communities (fish, wetlands, submerged aquatic vegetation, etc.).

1.4 LIMITATIONS

While this report takes a broad, "big picture" perspective of environmental conditions in DC, it simply cannot cover every topic, address every problem, and examine impacts to every resident. It is important to recognize that there are limitations to this study and report. First of all, this study relied on existing data - no new data were collected (no sampling was conducted). Rather, information was compiled from many agencies, organizations, and individuals (drawing from the knowledge of hundreds of experts). Although data are limited, the information sources used in assembling this report include:

Limitations in Scope

- Use of Existing Data
- Geographic Scale - Within DC
- Certain Human Health Topics
- Selected Measures of Ecological Health

- Articles published in the scientific literature;
- Data obtained from numerous individuals/organizations;
- Reports developed by local governmental agencies; and
- Data from electronic data bases.

Other limitations exist because the scope of the study had to be kept to a manageable size. Most noteworthy, the geographic scale was limited to within the boundaries of the District of Columbia. Obviously, water and air quality are affected by sources of pollution well beyond the District. Similarly, the District influences the environment of adjoining States. This need to consider environmental quality on a regional scale is especially apparent for the Anacostia River (and the streams/rivers that feed into it upstream in Maryland). Degradation of water quality has occurred to the Anacostia by the time it enters the District. However, it was necessary for this study to limit the geographic scope to within DC's borders.[1] Similarly, comparisons of environmental conditions across geographic areas within the District have not been made as the data are generally insufficient for such purposes.

Characterizing Risks -
Rather Than Risk Assessment

- Absence of Detailed Data Sets
- Screening/Qualitative Assessments
- Examination of "Surrogates of Risk"
- Indicators of Potential Magnitude of Impacts

It should be noted that this report is not a risk assessment; it uses qualitative or screening assessments, based on "surrogates of risk" to characterize risks (potential impacts of pollutants on human health and ecological resources). More definitive risk assessments would require site-specific data on the magnitude, duration, and frequency of releases of pollutants; site-specific environmental conditions; enumeration of human and ecological receptors; and identification of relevant exposure pathways. Such estimates of risks from each source would be a monumental effort, taking years and huge sums of money. Therefore, surrogates for risks are used as indicators of the magnitude of potential impacts to human health and the environment. By analyzing emissions data from facilities in DC, we are able to make

[1] It should be noted that many of the various restoration efforts related to the Anacostia River are being carried out in the broader, regional context which includes areas of Montgomery and Prince Georges counties in Maryland.

statements about sources of pollution. However, this study did not attempt to link sources of pollution with specific effects on human health or ecological condition. An environmental epidemiology effort to relate cause and effect would require extensive (and costly) collection of data on human health statistics, activity patterns, exposures, and related information.

In the area of characterizing environmental risks to human health, the scope was limited to a handful of issues that were selected as major topics of concern. Specifically included in this study were potential for human health impacts from: drinking (tap) water, fish consumption, air quality, lead (in several media), and contaminated soil. These topics were selected by the "Steering Committee" (consisting of representatives from EPA Region 3, EPA Office of Research and Development, EPA Office of Pollution Prevention and Toxics, and the District of Columbia Environmental Regulation Administration) because they are believed to be the major factors of concern for human health risks in DC. The Steering Committee considered these topics within the context of previous studies in DC as well as factors that are involved in similar studies conducted in Baltimore, Maryland, and Philadelphia and Chester, Pennsylvania. Other human health-related topics not specifically addressed in this study included asbestos, radon, pesticide use, solid waste/junk yards, underground storage tanks, or radioactive materials. Similarly, characterization of ecological health focused on a few limited measures of the extent, status, and trends of aquatic and terrestrial resources.

Characterizing Human Health Risks

- Drinking (Tap) Water
- Fish Consumption
- Air Quality
- Lead
- Contaminated Soil

In summary, the greatest limitations of this report result from the lack of comprehensive data. Better data are needed on levels of contaminants in various media and actual human exposures within specific areas of DC. Surprisingly, it appears that the ecological conditions in DC have been studied more extensively than human health impacts from environmental factors. Some of this disparity is explained by the need to fulfill specific requirements of the Federal Government for monitoring and reporting on water quality (e.g., 305(b) reporting) and the fact that an infrastructure exists to address the District's water quality in the larger context of programs to protect the Chesapeake Bay. With respect to human health exposure, very little data could be identified on important topics such as indoor air pollution, lead paint, wading/swimming, and activity patterns that may result in increased exposures. While a considerable amount of data were obtained for this effort (and are presented within), many gaps in knowledge still exist, which made this assessment more difficult to perform.

2. ENVIRONMENTAL SETTING IN DC

This section presents a brief overview of environmental conditions in the District of Columbia. These descriptions are intended to provide the overall context for the sections that follow. Various facts and statistics are presented that illustrate the "environmental setting" in DC. This information describes factors that may influence environmental risks to human health and the environment.

In a sense, the environment is a living, breathing organism. As such there are measures, or indicators, that can tell us something about the health of the environment. These indicators, much like a human being's vital signs, can be examined to determine the health of the environment. Similar to when one visits the doctor, who takes measures of pulse, blood pressure, and weight - the environment has vital signs that we can examine. Detailed below is information on several general indicators of the condition of the environment in DC. In some cases, these indicators are compared to measures from previous years to determine if conditions are improving. Other measures compare DC with other cities. Overall, these statistics tell a story about DC's environmental health.

General Environmental Indicators

- Population Density
- Air Quality
- Access to Parks
- Toxic Chemicals and Hazardous Wastes
- "Green Metro Index"

2.1 POPULATION DENSITY

Washington, DC is among the more densely populated cities in the United States, with a density of 9,528 individuals per square mile (U.S. Bureau of the Census, 1995). Population density can indicate the burden that urbanization can place on the environment. In general, higher population densities can be related to increases in energy consumption, challenges in providing drinking water, air pollution from motor vehicles, modification of wetlands and waterbodies, and other man-induced threats to the environment (World Resources Institute, 1993). Table 2-1 presents information on population density in DC and other major U.S. cities. The actual resident population of Washington, DC, in 1994 is reported in the *Statistical Abstract of the United States* to be 570,000 (U.S. Bureau of Census, 1995). Population density per square mile of land area was calculated for a selected number of cities in the United States. Population data were obtained from 1992 census data, while the land area data were obtained from the 1990 census data (U.S. Bureau of the Census, 1995).

Table 2-1. Population density in major U.S. cities.

City	Population/square mile
1. New York, NY	23,671
2. San Francisco, CA	15,610
3. Chicago, IL	12,183
4. Philadelphia, PA	11,495
5. Boston, MA	11,405
6. Miami, FL	10,309
7. Washington, DC	**9,528**
8. Baltimore, MD	8,985
9. Los Angeles, CA	7,437
10. Detroit, MI	7,296
11. Milwaukee, WI	6,420
12. Seattle, WA	6,198
13. San Jose, CA	4,676
14. Ann Arbor, MI	4,247
15. San Diego, CA	3,546

Source: U.S. Bureau of the Census, 1995.

2.2 AIR QUALITY

The quality of the air is an indicator of environmental conditions, with respect to both human health and ecological resources. In general, DC's air is cleaner than many other major metropolitan areas in the United States (World Resources Institute, 1993). Table 2-2 presents air quality rankings for selected metropolitan areas, based on EPA's Pollutant Standard Index (PSI). The U.S. EPA provides this information taking into account daily monitoring of sulfur dioxide, nitrogen oxides, particulates, carbon dioxide, and ozone. PSI levels above 100 are characterized as unhealthful. DC's average PSI of 32 ranks among the top cities with respect to ambient air quality (World Resources Institute, 1993). However, DC's major air pollution problem has been ozone (highest in the summer), and is a nonattainment area for ozone because of past exceedances of national standards. Levels in the DC metropolitan area are somewhat lower than in some other major metropolitan areas (Table 2-3). In addition, ozone levels seem to be decreasing in recent years. Figure 2-1 presents data on trends in ozone (number of days exceeding standard) levels for the DC metropolitan area from 1979 - 1994. Although ozone levels vary considerably due to weather conditions, levels are noticeably lower during the 1990s than in the previous 20 years, and have resulted in fewer exceedances of the standard (MWCOG, 1996).

Various sources affect air quality in the DC area, most notably, motor vehicles. Motor vehicles account for about 28% of the air pollutants in the Washington region that form ozone (MWCOG, 1996). Large industrial factories, such as power plants, only account for a small portion (about 3%) of the emissions that contribute to ozone formation (MWCOG, 1996). With respect to the contribution of motor vehicles to air pollution, DC has a high level of road usage. Data from the U.S. Federal Highway Administration (U.S. Bureau of the Census, 1995), were used to calculate the annual vehicle miles of travel per mile of road for States. In 1993, it was reported that 3,148,000 vehicle miles per mile of road were in traveled in DC. This high level of motor vehicle usage is one explanation for the DC metro area's ozone problems. However, DC's mass transit system (METRO), has one of the highest use rates in the Nation (Table 2-4).

2.3 ACCESS TO PARKS

A desirable quality of the environment is access to nature and parks. Washington, DC is predominately an urban area within a larger, semi-developed metropolitan area. DC has 20% of its land area as parkland, one of the highest in the Nation (World Resources Institute, 1993). Table 2-5 presents data on urban parkland in various U.S. cities. These parklands support wildlife as well as recreational use by residents.

Table 2-2. Air quality in selected metro areas.[a]

Metro area	Average PSI	Metro area	Average PSI
Honolulu	15	Tulsa	42
San Francisco-Oakland	20	Detroit	43
Kansas City	28	Grand Rapids	43
Washington, DC	**32**	Dallas-Ft. Worth	43
Pittsburgh	32	Milwaukee	44
Scranton	33	Las Vegas	44
Chicago	33	St. Louis	44
Louisville	33	Toledo	45
Albany	33	New York	46
Rochester	34	Columbus	46
Allentown	34	Jacksonville	46
Cleveland	35	Tampa-St. Petersburg	46
Harrisburg	35	Atlanta	47
Providence	35	Baton Rouge	47
Salt Lake City	36	El Paso	48
New Haven	36	Phoenix	48
Nashville	37	Memphis	49
Omaha	37	Tucson	49
Austin	38	Indianapolis	49
New Orleans	38	Bakersfield	51
Denver	39	Sacramento	51
Baltimore	39	Knoxville	52
Philadelphia	39	Charlotte	54
Worcester	39	San Diego	54
San Antonio	39	Houston	56
Cincinnati	40	Raleigh-Durham	56
Oklahoma City	41	Fresno	56
Dayton	42	Los Angeles	73
Orlando	42		

[a] EPA Aeromatic Information Retrieval System, Pollutant Standard Index (PSI) Summary, 1990
Source: World Resources Institute, 1993.

Table 2-3. Metropolitan areas failing to meet National Ambient Air Quality Standards for ozone average number of days exceeding standards: 1991 to 1993.

Metropolitan area	1991-93, avg.	1993[1]	Metropolitan area	1991-93 avg.	1993[1] avg.
Albany-Schenectady-Troy, NY	--	--	Los Angeles South Coast Air, CA[6]	104.3	97.6
Allentown-Bethlehem-Easton, PA-NJ	--	--	Manchester, NH	--	--
Altoona, PA	--	--	Manitowoc Co. WI	2.0	--
Atlanta, GA	4.2	4.3	Memphis, TN-Ar-MS	0.3	1.0
Atlantic City, NJ	1.0	0.0	Miami-Fort Lauderdale, FL CMSA	--	1.0
Baltimore, MD	4.8	6.2	Milwaukee-Racine, WI CMSA	3.9	2.4
Baton Rouge, LA	1.8	3.0	Monterey Bay, CA[7]	0.4	--
Beaumont-Port Arthur, TX	2.7	0.0	Muskegon, MI	2.3	1.0
Birmingham, AL	0.7	1.0	Nashville, TN	1.1	2.1
Boston-Lawrence-Salem, MA-NH CMSA[2]	3.1	4.0	New York, NY-NJ-CT CMSA[8]	6.1	6.0
Buffalo-Niagara Falls, NY CMSA	--	--	Norfolk-Virginia Beach-Newport News, VA	1.7	3.0
Canton, OH	0.3	--	Owensboro, KY	--	--
Charleston, WV	0.3	--	Paducah, KY[4]	--	--
Charlotte-Gastonia-Rock Hill, NC-SC[3]	0.7	2.1	Parkersburg-Marietta, WV-OH	--	--
Chicago-Gary-Lake County, IL-IN-WI CMSA	4.7	2.4	Philadelphia, PA-NJ-DE-MD CMSA	10.3	5.2
			Phoenix, AZ	4.0	2.0
Cincinnati-Hamilton, OH-KY-IN CMSA	1.3	1.0	Pittsburgh-Beaver Valley, PA CMSA	0.7	--
Cleveland-Akron-Lorain, OH CMSA	1.7	--	Portland-Vancouver, OR-WA CMSA	0.7	--
Columbus, OH	0.3	--	Portland, ME	11.8	3.8
Dallas-Fort Worth, TX CMSA	1.0	2.3	Portsmouth-Dover-Rochester, NH-ME	2.2	1.1
Dayton-Springfield, OH	0.0	1.0	Poughkeepsie, NY	1.4	2.0
Detroit-Ann Arbor, MI CMSA	1.0	1.0	Providence, RI[9]	4.0	1.4
Door County, WI[4]	1.6	--	Reading, PA	0.3	--
Edmonson County, KY[4]	--	--	Reno, NV	--	--
El Paso, TX	3.7	4.1	Richmond-Petersburg, VA	1.4	3.1
Erie, PA	--	--	Sacramento, CA	9.7	3.6
Essex County, NY[4]	--	--	St. Louis, MO-IL	1.7	2.1
Evansville, IN-KY	--	--	Salt Lake City-Ogden, UT	--	--
Grand Rapids, MI	3.4	1.0	San Diego, CA	11.8	4.0
Greater Connecticut, CT[5]	7.5	6.0	San Joaquin Valley, CA	18.9	27.5
Greenbrier County, WV[4]	0.4	--	San Francisco-Bay area, CA	0.7	2.0
Hancock and Waldo Counties, ME[4]	1.3	--	Santa Barbara-Santa Maria-Lompoc, CA	1.0	--
Harrisburg-Lebanon-Carlisle, PA	0.0	--	Scranton-Wilkes-Barre, PA	0.4	--
Houston-Galveston-Brazoria, TX CMSA	6.3	10.4	Seattle-Tacoma, WA	--	--
Huntington-Ashland, WV-KY-OH	1.0	1.0	Sheboygan, WI	2.6	--
Indianapolis, IN	--	--	Smyth County, VA[4]	(NA)	(NA)
Jefferson County, NY[4]	--	--	South Bend-Mishawaka, IN	--	--
Jersey Co., IL[4]	0.7	2.0	Southeast Desert Modified AQMD, CA[10]	59.3	72.6
Johnstown, PA	--	--	Springfield, MA	4.6	6.2
Kent County and Queen Anne's Co., MD[4]	2.8	2.0	Sussex County, DE[4]	1.0	--

Table 2-3. Metropolitan areas failing to meet National Ambient Air Quality Standards for ozone average number of days exceeding standards: 1991 to 1993. (continued)

Metropolitan area	1991-93, avg.	1993[1]	Metropolitan area	1991-93 avg.	1993[1] avg.
Kewaunee County, WI[4]	0.8	0.0	Tampa-St. Petersburg-Clearwater, FL	--	--
Knox and Lincoln counties, ME[4]	2.3	1.2	Toledo, OH	0.3	1.0
Lake Charles, LA	1.3	--	Ventura County, CA	15.9	9.0
Lancaster, PA	0.3	1.0	Walworth County, WI	0.3	--
Lewiston-Auburn, ME	0.3	--	**Washington, DC-MD-VA**	**1.4**	**3.1**
Lexington-Fayette, KY	--	--	York, PA	--	--
Louisville, KY-IN	2.2	2.0	Youngstown-Warren, OH[11]	0.3	1.0

-- = Zero.
NA = Not Available.
1 = May represent a different monitoring location than one used to calculate average.
2 = Includes also both the Worcester, MA, and New Bedford, MA, MSAs.
3 = Excludes York Co., SC.
4 = Not a metropolitan area.
5 = Primarily represents Hartford-New Haven area.
6 = Primarily represents Los Angeles and Orange counties.
7 = Primarily represents Monterey, Santa Cruz, and San Benito counties.
8 = Excludes the Connecticut portion.
9 = Covers entire State of Rhode Island.
10 = Represents primarily San Joaquin, Turlock, Merced, Madera, Fresno, Kings, Tulare, and Kern counties.
11 = Includes Sharon, PA

Source: U.S. Bureau of the Census (1995), citing the U.S. Environmental Protection Agency, (1993) *Air Quality Update,* October 1994.

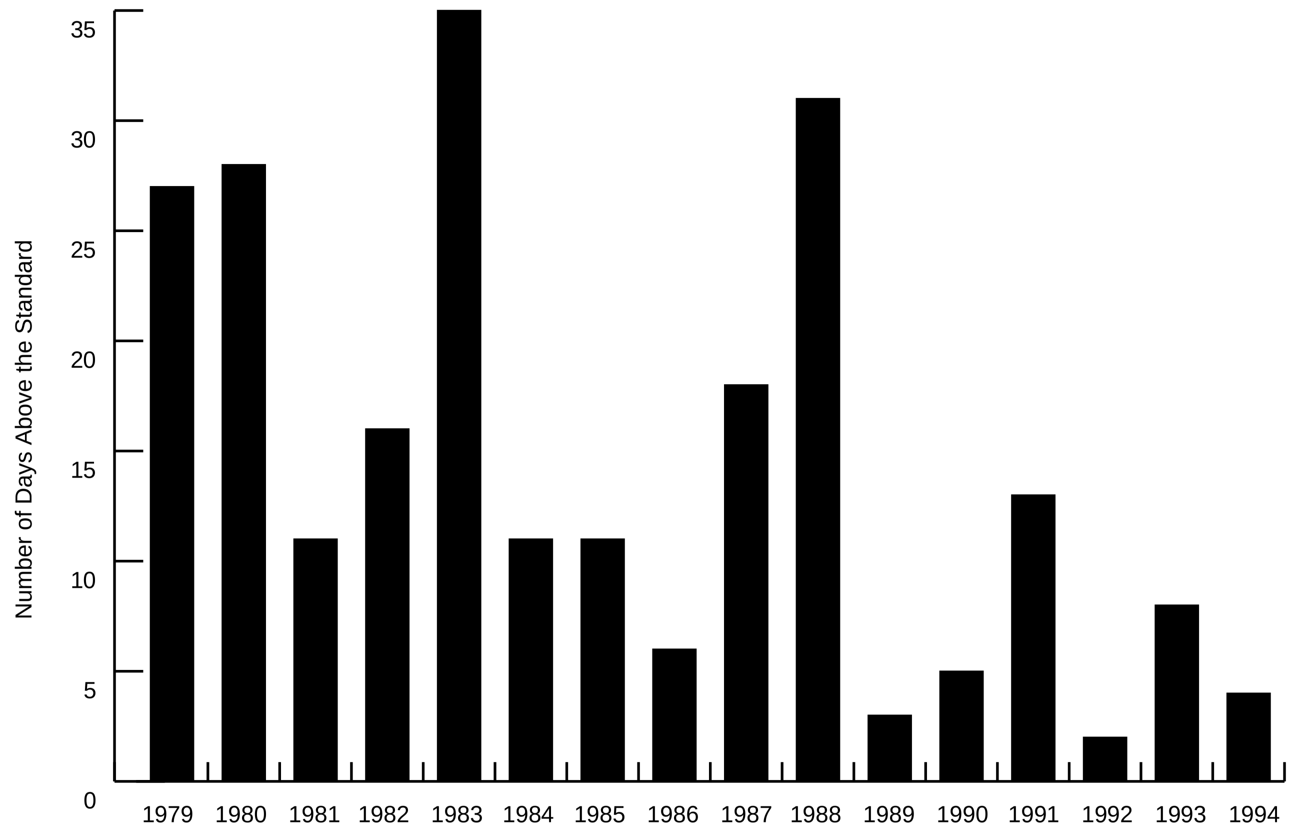

Figure 2-1. Ozone exceedance days for Washington Metropolitan Area (1979-1994).

Source: MWCOG, 1996.

Table 2-4. Mass transit passenger miles[a].

Metro area	**Thousand miles per year (per capita)**
New York	1.0141
Washington, DC	**0.5934**
Chicago	0.5566
San Francisco-Oakland	0.4648
Atlanta	0.3919
Seattle-Tacoma	0.3477
Philadelphia	0.2992
Pittsburgh	0.2239
Los Angeles	0.2154
Houston	0.1986
New Orleans	0.1898
Denver	0.1520
Minneapolis-St. Paul	0.1498
Cleveland	0.1226
Cincinnati	0.1128
Dallas-Ft. Worth	0.0994
Detroit	0.0885
Phoenix	0.0758
Las Vegas	0.0731
Norfolk	0.0588
Harrisburg	0.0386
Knoxville	0.0338
Raleigh-Durham	0.0297
Oklahoma City	0.0199
Greensboro	0.0022

[a] U.S. Department of Transportation, *National Urban Mass Transportation Statistics,* November 1990, Table 3.16, p. 3-315.

Source: World Resources Institute, 1993.

Table 2-5. Access to nature (urban parkland) in U.S. cities.

City	Parkland (percent of area)	City	Parkland (percent of area)
Honolulu	40.68	Columbus	5.80
Washington, DC	**20.60**	Los Angeles	5.30
Minneapolis	17.30	Toledo	5.30
Tulsa	14.00	Miami	5.10
St. Paul	12.00	Indianapolis	5.00
El Paso	11.70	Newark	5.00
Buffalo	11.50	Ft. Worth	4.70
Portland	11.00	Denver	4.00
Chicago	10.50	Oklahoma City	4.00
Seattle	10.00	New Orleans	3.60
Omaha	9.80	Arlington	3.00
Dallas	9.00	Birmingham	3.00
Cincinnati	9.00	Tucson	2.91
Pittsburgh	7.30	Fresno	1.56
Virginia Beach	7.10	Milwaukee	1.00
Oakland	7.00	Kansas City	0.05
Austin	6.80	Jacksonville	0.01
Wichita	5.99		

Source: World Resources Institute, 1993.

2.4 TOXIC CHEMICALS AND HAZARDOUS WASTES

Releases of toxic chemicals and generation of hazardous wastes can be potentially degrading to the environmental conditions. Table 2-6 presents information on the amounts of toxic pollutants released in major metropolitan areas. The DC metropolitan area has one of the lowest amounts of toxic chemicals released (based on the EPA Toxic Release Inventory (TRI) as reported by World Resources Institute (1993). In fact, no facilities within DC's borders report toxic chemical releases as part of the TRI. (See Section 3.1.5 for more information on TRI.) Hazardous waste generation in DC has declined in recent years. Based on data compiled as part of the EPA Biennial Report on hazardous waste management, the amount of waste generated by large quantity generators was more than 620 tons in 1993. Figure 2-2 displays trends in hazardous waste generation in DC, with a slight decrease in the more recent years.

2.5 GREEN METRO INDEX

One overall indicator of environmental health is available. The Green Metro Index is an environmental ranking system for major metro areas compiled by World Resources Institute (1993). This index combines eight measures such as the average air quality, acute air quality, water quality violations, toxic releases, Superfund sites, mass transit use, residential energy use, and gasoline and electricity prices. Washington DC's position is near the top of this list (Table 2-7), indicating that environmental-related conditions in DC are generally better than in most major cities/metropolitan areas in the United States (World Resources Institute, 1993).

In summary, Washington DC's environmental conditions are generally favorable; however, there are problems that must be addressed. The following sections provide additional information on sources of pollution and the types of contaminants present in environmental media that can pose risks to human health and ecological resources in DC.

Table 2-6. Toxic chemical releases and transfers.[a]

Metro area	**Amount (pounds per year)**
West Palm Beach	943,459
Fresno	1,054,243
Washington, DC (metro area)	**1,107,218**
Tucson	1,235,512
El Paso	1,517,720
Little Rock	2,826,267
Raleigh-Durham	4,034,662
San Antonio	4,036,402
Oklahoma City	4,269,395
Miami	4,822,142
San Diego	6,089,986
Denver	6,617,837
Tampa-St. Petersburg	7,171,038
Hartford	7,389,714
Phoenix	7,473,876
Norfolk	7,634,531
Omaha	9,564,863
Jacksonville	9,690,225
Portland	10,976,256
Atlanta	12,915,673
Kansas City	14,031,849
Baltimore	14,997,426
Dallas-Ft. Worth	16,669,699
Seattle-Tacoma	17,185,029
Boston	17,491,237
Louisville	19,321,492
San Francisco-Oakland	19,521,589
Columbus	20,520,317
Grand Rapids	21,833,254
Charlotte	21,833,254
Minneapolis-St. Paul	24,813,330
Pittsburgh	30,689,769
Richmond	34,410,782
Cleveland	44,822,133
Philadelphia	72,824,789
St. Louis	83,949,520
Detroit	85,046,048
Los Angeles	90,368,911
Salt Lake City	110,789,489
New York	144,773,930
Chicago	162,833,008
New Orleans	186,704,887
Houston	264,880,496

[a] All Toxic Chemical Release Inventory submissions in TRIS as of March 22, 1992.

Source: World Resources Institute, 1993.

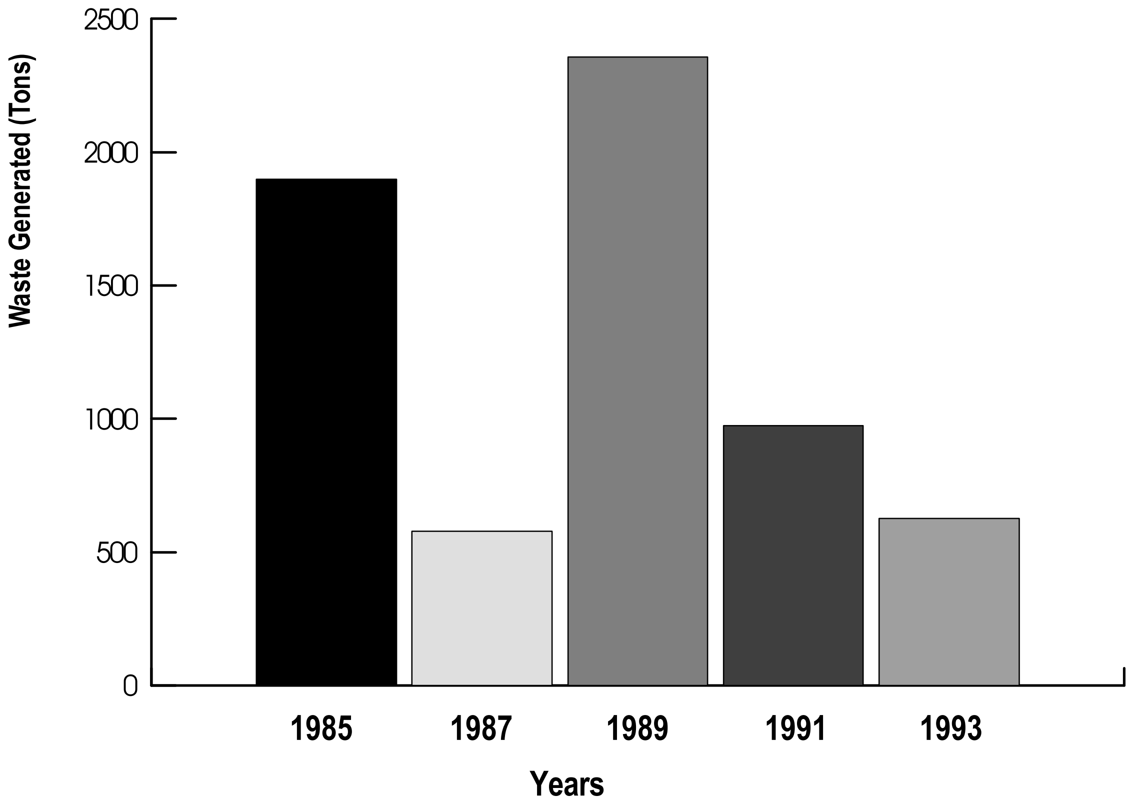

Figure 2-2. Trends in hazardous waste generation in Washington, DC (1985-1993).

Source: EPA RCRA Hotline, 1996.

Table 2-7. Green Metro Index.

Metro area	Rank[a]	Metro score	Rank area	Rank	score
Honolulu	1	4.75	New York	39	18.88
San Diego	2	9.78	Dayton	40	19.00
San Francisco-Oakland	3	10.78	Allentown	41	19.29
El Paso	3	10.78	Los Angeles	42	19.56
Washington	**5**	**11.44**	Salt Lake City	43	19.63
Austin	6	12.14	Cincinnati	44	19.67
Fresno	7	12.75	Portland	45	19.86
New Bedford	8	13.00	Charlotte	46	10.00
Tuscon	9	13.29	Raleigh-Durham	47	20.14
New Haven	10	13.57	Syracuse	48	20.20
Rochester	11	13.71	Louisville	49	20.56
San Antonio	12	13.88	West Palm Beach	50	20.60
Bakersfield	13	14.29	Dallas-Ft. Worth	51	21.00
Pittsburgh	14	14.44	Houston	52	21.22
Miami	15	14.86	Oklahoma City	53	21.33
Atlanta	16	15.11	Nashville	54	22.44
Boston	17	15.13	Omaha	54	22.44
Albany	18	15.25	Knoxville	56	23.00
Toledo	19	15.88	Norfolk	57	23.00
Baltimore	20	16.11	Milwaukee	58	23.22
Sacramento	21	16.22	Seattle-Tacoma	59	23.29
Denver	22	16.33	Richmond	60	23.57
Orlando	23	16.50	Columbus	61	23.89
Harrisburg	24	16.57	St. Louis	61	23.89
Chicago	25	17.00	Detroit	63	24.11
Providence	25	17.00	Memphis	64	25.00
Philadelphia	27	17.11	Buffalo	65	25.14
Phoenix	28	17.22	Kansas City	66	25.38
Worcester	29	17.29	Indianapolis	67	27.44
Scranton	30	17.33	Tulsa	68	27.71
New Orleans	31	17.44	Birmingham	69	27.83
Springfield	32	17.60	Grand Rapids	70	28.57
Las Vegas	33	17.63	Baton Rouge	71	28.86
Cleveland	34	17.89	Charleston	72	30.40
Hartford	35	18.33	Minneapolis-St. Paul	73	30.71
Jacksonville	36	18.33	Greenville	74	31.40
Little Rock	37	18.43	Greensboro	75	33.20

NOTE: Except where indicated by equal rank, apparent ties are the result of rounding.

[a] (1 = best, 75 = worst)

Source: World Resources Institute, 1993.